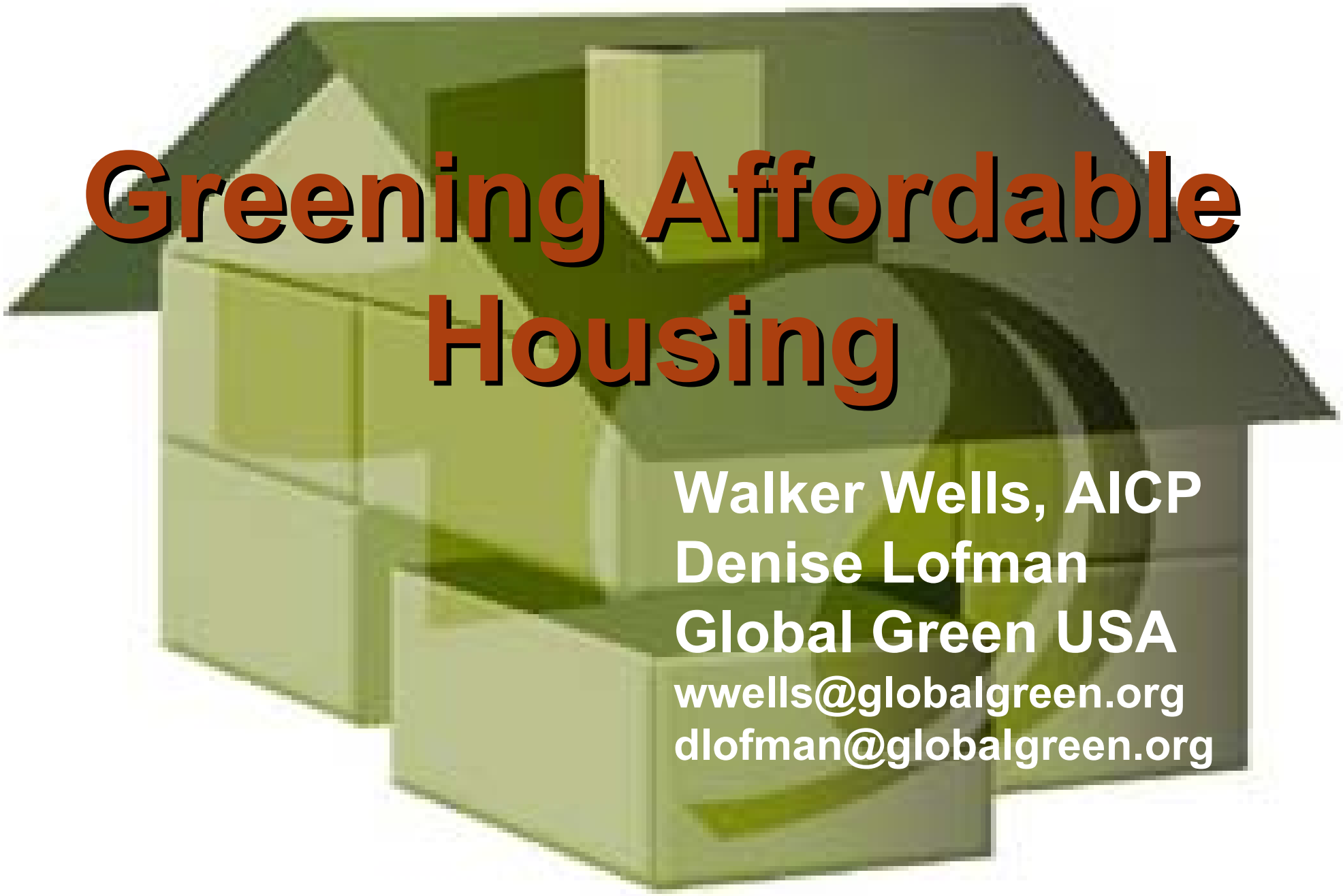

Greening Affordable Housing

Walker Wells, AICP
Denise Lofman
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Global Green USA

- US affiliate of Green Cross International, which is led by President Mikhail Gorbachev
- Global Green USA is headquartered in Los Angeles, California
- RESCUE PROGRAM

Resource Efficiency and Sustainable Communities for the Urban Environment

Green Building

- Local Government Initiative
- Greening Affordable Housing Initiative

Sustainable Energy

- Energy Efficiency
- Green Power
- Renewables

Greening Affordable Housing Initiative

- Purpose
  - *Reduce resource consumption and foster sustainable communities by encouraging the design, construction, rehabilitation, and maintenance of resource efficient affordable housing.*

- Program Efforts
  - Technical Assistance
  - Workshops
  - Design Charrettes
  - Publications
  - Advocacy and Policy

Why Green Building?

Buildings in the US account for roughly

- 40% of energy use (mostly from operation, also from manufacturing & transporting material)
- 30% of CO2 emissions (from energy use)
- 16% of water use (bldg. operation + power plant coolant)
- 40% of the raw materials entering the global economy
- 25% of the world's virgin wood use - Construction of one conventional house uses up to 300 old growth trees
- 20-30% of U.S. landfill waste - 136 million tons of C&D waste (approx. 2.8 lbs/person/day, most of which is recyclable)

Environmental Impacts of Buildings

- Typical new home generates 5 tons of waste
- EPA estimates that over $60 billion/ year in medical costs can be attributed to poor indoor air quality
- Air inside the average home can be 10 times worse than outside air
- Americans spend over 80% of their time indoors.

[Sources: Worldwatch Institute Paper 124, ‘95; EPA brochure 231F-97-006, ‘97]

Why Affordable Housing?

- Long-Term Ownership. Projects are typically owned and operated by the same organization for many years (most are deed restricted for 55 years) -- long payback periods are justified.
- Dollar Savings. Utility savings have greatest value to low-income families (can be up to 25% of living expenses after rent) or can be directed to other organizational priorities.
- Public Health. Formaldehyde and other indoor pollutants can impact children's ability to learn and increase incidence of asthma.
- Housing should be affordable - not cheap!

Benefits of Green Housing

- Lower water and energy bills
- Reduced maintenance costs
- Healthier living environments
- Efficient use of resources
- Improved safety and security
- Neighborhood revitalization

Green Building
Myth

Green Building
Reality

5 Components of Green Building

- SITE: *site selection & planning, landscaping, stormwater management, construction and demo recycling*
- WATER EFFICIENCY: *efficient fixtures, wastewater reuse, efficient irrigation*
- ENERGY/ATMOSPHERE: *energy efficiency, clean/renewable energy, no HCFCs or CFCs*
- MATERIALS/RESOURCES: *materials reuse, efficient building systems, use of recycled and rapidly renewable materials*
- INDOOR ENVIRONMENTAL QUALITY: *improved indoor air quality, increased daylighting, better thermal comfort/control*

Green Building Is a Process!

Green building is a process that creates buildings and supporting infrastructure that minimizes the use of resources, reduces harmful effects on the environment, and develops healthier environments for people.

- Multi-disciplinary design teams
- Collaboration from the beginning
- Hold charrette/Involve community
- Commitment to performance targets
- Ongoing communication and feedback
- Develop cost estimates throughout the design process

Spheres of Green Building Benefit

Energy Savings

Improved Air Quality

Direct Benefit (Individual/Org)

Reduced Maintenance

Spheres of Green Building Benefit

Stormwater Retention

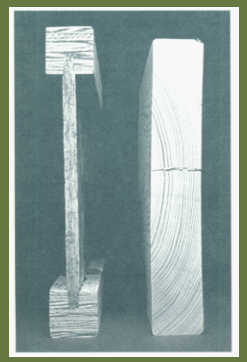
Direct & Indirect Benefit (Regional and Indiv/Org)

Direct Benefit (Individual/Org)

Waste Management/ Recycled Materials

Spheres of Green Building Benefit

Forest Protection



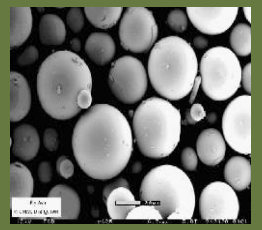
FSC

Indirect (Global)

Direct & Indirect Benefit (Regional and Indiv/Org)

Direct Benefit (Individual/Org)

Stemming Climate Change



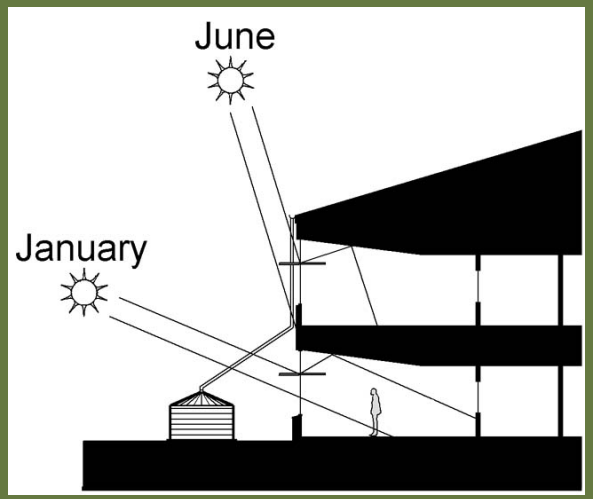
Top 20 No/Low Cost Green Building Strategies

ENERGY

1. Maximize natural daylighting
2. Provide overhangs on south facing windows
3. Select light colored roofing
4. Install whole house fans or ceiling fans
5. Install double-paned, low-e windows
6. Install high R-value insulation
7. Install fluorescent lights with electronic ballasts
8. Eliminate air conditioning
9. Use hydronic heating
10. Install Energy Star appliances

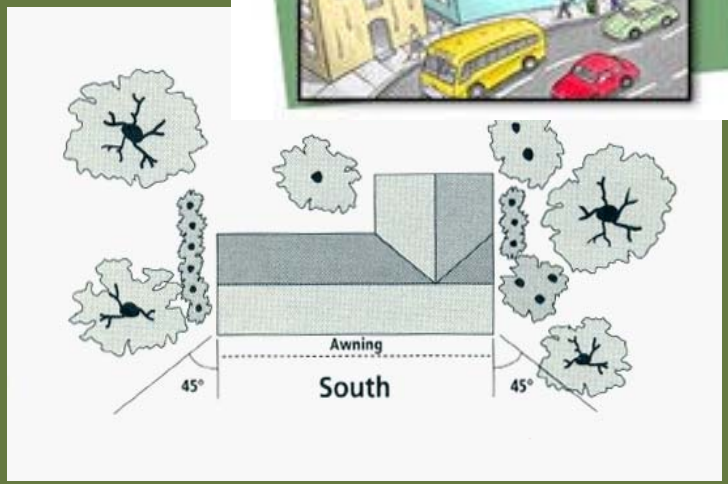
Daylighting

- Use narrow floor plates to increase daylight access
- Place windows and design floor plan to provide daylight in all living spaces
- Extend daylight penetration through the use of reflective surfaces



Natural Cooling

- Plant deciduous trees for shade on east and west facades
- Provide overhangs and awnings on south-facing windows
- Install whole-house fan
- Install “Cool Roof” radiant heat-reflective barriers

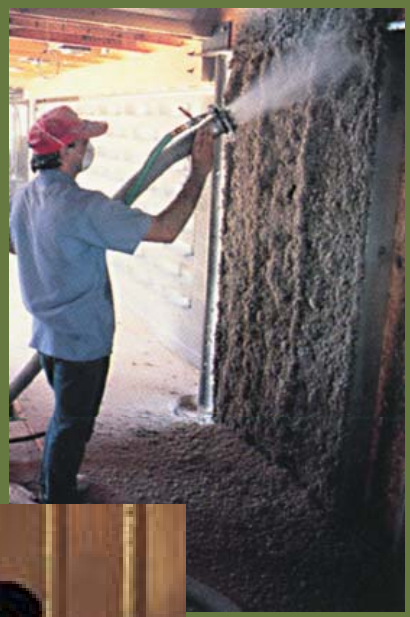


Windows

- Install double-paned, low emmisivity windows
- Allow for good natural ventilation through the separation of heights of inlet and outlet windows
- Locate inlets upwind, outlets downwind

Insulation

- Increase R-value of insulation within cavity provided
- Consider providing a deeper cavity for insulation
- Seal all openings for plumbing and electrical
- At a minimum, use recycled, formaldehyde -free insulation
- Consider using blown cellulose with low toxic binders



Lighting, Equipment, Appliances

- Install fluorescent light fixtures in units and common areas
- Install occupancy sensors
- Eliminate air conditioning
- Install combined hydronic heating
- Select high-efficiency heating (AFUE 90% or better) and cooling systems (SEER 12 or above)
- Provide Energy Star applicances

Top 20 No/Low Cost Green Building Strategies

WATER

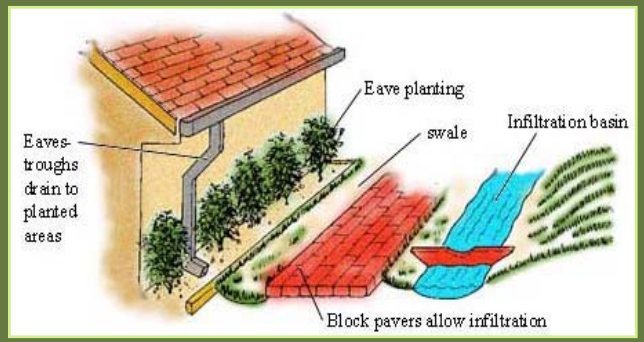
11. Design water efficient landscapes
12. Install water efficient toilets and fixtures
13. Use permeable paving materials

MATERIALS

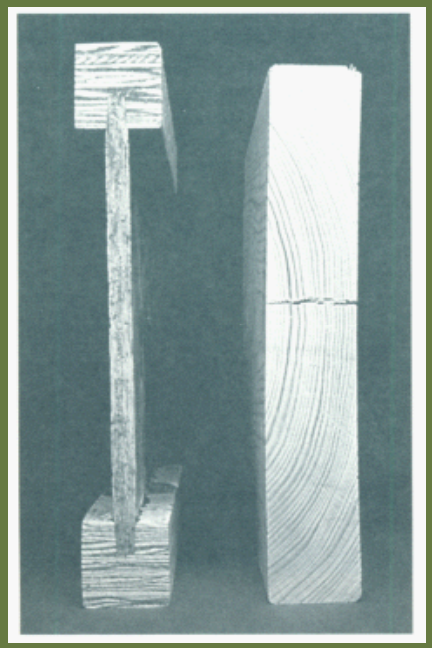
14. Use 30-50% or greater flyash in concrete
15. Use engineered wood for headers, joists, sheathing
16. Use recycled-content carpet, drywall, insulation, etc.

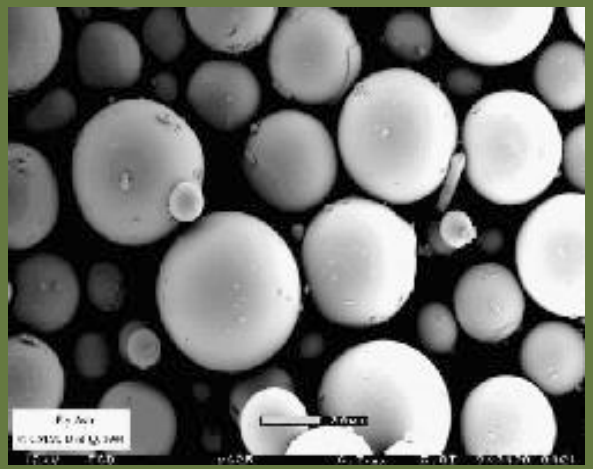
Landscape Design and Stormwater Management

- Minimize impervious paving
- Preserve existing trees to control erosion and reduce heat island effect
- Provide swales or sumps for stormwater retention
- Select native plants
- Incorporate edible landscape
- Provide on-site composting facilities



Materials





- Specify minimum of 25% fly ash content in concrete
- Use engineered lumber (gluelam, microlam, laminated veneer lumber, wood “I” joists, oriented strand board [osb], or parallel strand lumber) structural materials instead of conventional lumber
- Specify recycled content steel
- Consider structural panels or other manufactured systems (SIPS, ICF)

Materials

- Incorporate salvaged or reused materials
- Select recycled-content materials
  - Carpet, carpet padding
  - Playground surfaces
  - Decking

ReStore

Materials

- Specify non-toxic/healthy materials
  - Urea-formaldehyde free counter substrate and cabinets (All Green or Medite II)
- Utilize materials from renewable sources
  - FSC certified wood
  - Natural linoleum

medite II
FORMALDEHYDE FREE

Top 20 No/Low Cost Green Building Strategies

INDOOR AIR QUALITY

17. Use low- or no-VOC paint
18. Use formaldehyde free or fully sealed material for cabinets and counters
19. Vent rangehood to the outside
20. Install carbon monoxide detector

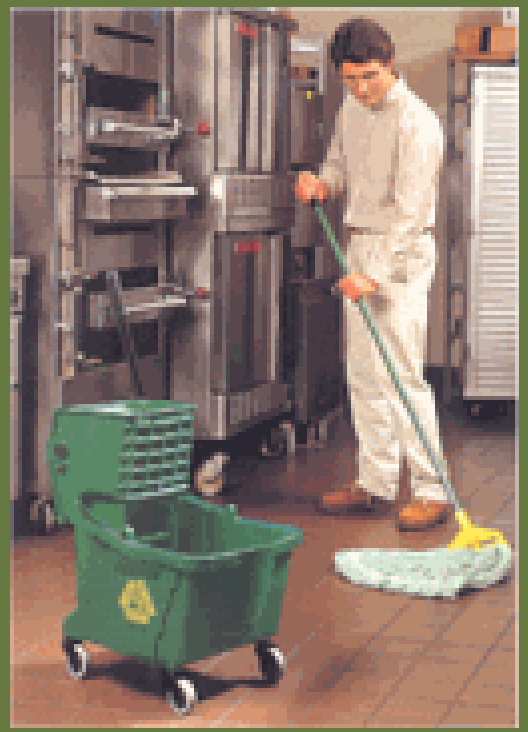
Post-Construction: Prepare operation and maintenance plan

Finishes/Indoor Air Quality

- Use Low/No-VOC AND Formaldehyde-Free Interior Paint
  - VOC's have adverse impact on indoor air quality and health
  - Low/no-VOC paint available at minimal increased cost
  - Reduces formation of urban smog
- Provide Carbon Monoxide Detector
- Vent Range Hood to the Outside
- Provide Maintenance Plan

Operations & Maintenance

- Use non-toxic cleaning materials and pesticides
- Install HEPA filters
- Participate in recycling programs
- Provide tenants with handbook on operation and maintenance of green features during orientation
- Conduct on-going outreach on green features and their use and care



CASE STUDIES

-Resourceful Building - Emeryville, CA

Emeryville Resourceful Building

Project Information

- 3 unit infill affordable housing for first time home buyers
- Life cycle costs - long term cost savings
  - Project cost no more than conventional affordable housing
- Partners: Emeryville Redevelopment Agency, ACWMA

Emeryville Resourceful Building

- Siegel & Strain Architects found the cumulative effect of small environmental improvements combined with selected cost-saving measures can generate significant results
- Findings Include:
  - Optimizing wall assemblies reduced fuels used in material production by 37%
  - Cement-fiber siding lasts 30 years longer than standard wood-compost siding and will save $24,459 over 50 years
  - Energy efficiency measures such as shading windows to keep interiors cool, save homeowners $200 per year and reduce operating energy by 33%

Emeryville Resourceful Building

- Using Materials Efficiently: Optimized Framing
  - Reduced wood used for framing by 19%
  - Installed cost savings of $2,214 (6%)

Cost Estimates and Long-Term Costs

In order to select cost-effective environmental measures it is essential to know the cost of each measure and the effect on the project cost.

- Larry Strain, AIA

Comparative Cost Estimates:
- Exterior wall assemblies
- Roof assemblies
- Ground floor assemblies
- Interior wall assemblies

Life-Term Cost Analysis:
- Siding
- Roofing
- Flooring

Interior Wall Assemblies – Cost Comparison			
Standard	*$/Sq. Ft.*	*Selected*	*$/Sq. Ft.*
2X4 DF @ 16” OC	$2.35	Certified 2X6 @ 24”OC	$2.00
1/2” Gypsum Board	$2.30	5/8” Gypsum Board	$2.50
Standard Caulking	$0.10	Low VOC Caulking	$0.16
Standard Paint	$1.10	Low VOC paint	$1.50
MDF Baseboard	$0.40	Low VOC MDF Baseboard	$0.60
$/Sq. Ft. of Wall	$6.25		$6.76
Total Sq. Ft. Wall	6,500		6,500
Total Project Cost	$40,625		$43,940

• Total cost of the selected wall assembly added about 8/10 of 1% to the project cost. Environmental benefits: reduced wood use, reduced impacts from forestry and timber production, and reduced VOC emissions from caulks, paints, and glues

Long-Term Cost Savings – Sheet Vinyl			
Vinyl		*Linoleum*	
Cost/Sq. Ft.	$3.50	Cost/Sq. Ft.	$5.00
Installed Cost	$980	Installed Cost	$1,400
Lifetime	20 years	Lifetime	40 years
Replacement Cost at 20 Years	$980	Replacement Cost at 20 Years	0
Replacement Cost at 40 Years	$1,960	Replacement Cost at 40 Years	$1,400
		Savings over 40 Years	$580

- Environmental benefits: Conserves resources, reduces material sent to landfill and pollution at place of manufacture, improves IAQ
- The amount of sheet installed in the project was minimal. The long-term savings would increase if the linoleum covered a greater percentage of the floor area

Finding Cost-Effective Solutions

- Project budget only allowed for minor cost increases for green features
- Proposed improvements that were not within budget were eliminated
- Improvements were evaluated by whether or not they provided a direct benefit to occupant in the form of lower utility bills, improved health and comfort, or reduced maintenance

Finding Cost-Effective Solutions

- Although selected assemblies increased the estimated project cost by 3%, the lowest contract bid was within budget
- Architects designed a similar affordable housing project in the same neighborhood, but without environmental considerations ... project costs examined by square foot were nearly identical

Making It Happen

8 Steps to Funding Green

1. Minimize additional costs through integrated design
2. Identify opportunities to partner with local government, state agencies, and non-profits
3. Work with contractor on cost estimates throughout project
4. Contact local utilities to identify incentives or buy-down programs for energy features
5. Utilize technical support provided by utilities, state or federal programs
6. Include green features as specification alternatives in the bid documents
7. Approach foundations and local government for additional funds
8. Apply remaining contingency funds to green features

Making it Happen!
Greening Affordable Housing Policy

California Tax Credit Allocation Committee

- New projects which increase energy efficiency by at least 15% above Title 24 standards, or a rehabilitation project that will increase its existing energy efficiency by at least 25% will receive 5 points

Making it Happen!
Greening Affordable Housing Policy

California Tax Credit Allocation Committee

- Projects that incorporate items from the following list may receive an additional 1 point for each to a maximum of 3 points:
  - Use energy star appliances
  - Natural gas for cooking and space heating
  - Use occupancy sensors to turn off lights for
  - all bathrooms, garages, and storage spaces
  - Fluorescent light fixtures
  - Use of water-efficient landscape and irrigation
  - Use of formaldehyde free or fully sealed particleboard or fiberboard for all cabinets, countertops and shelving

  - Certification of items is required

Making it Happen!
Greening Affordable Housing Policy

California Tax Credit Allocation Committee

A further four percent (4%) increase in the Threshold Basis Limits will be permitted for projects that include three of the following energy efficiency, resource conservation, indoor air quality items:

- Exceed Title 24 standards by at least 20%
- Use Energy Star rated refrigerators, dishwashers, clothes washers, furnaces, and air conditioners
- Use gas ovens, stoves, and clothes dryers
- Use tankless hot water heaters

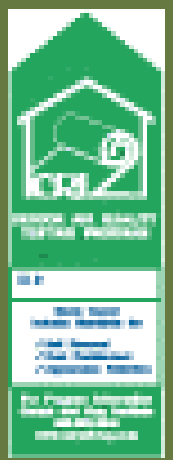
Making it Happen!
Greening Affordable Housing Policy

Energy efficiency, resource conservation, indoor air quality items continued...

Use linoleum or ceramic tile for all kitchens and bathrooms (where low toxic adhesives or backing is also used)

Use natural fiber woven carpet, recycled-content carpet, recycl carpet tiles, cork, bamboo, linoleum, or hardwood floors in living rooms and bathrooms (where low toxic adhesives or backing is also used)

Use Energy Star rated roof(s)



Making it Happen!

Local Initiatives

- Santa Monica Housing Division developed a green building checklist that has been incorporated into the loan application submittal and review process

- Portland created "Greening Portland's Affordable Housing: Design and Construction Guidelines to Improving Environmental Performance, Tenant Health, and Long-Term Durability in Affordable Housing"

Making it Happen!

Federal Programs

DOE Rebuild Program

Private-public partnerships that focus on energy-saving solutions

EPA Energy Star Homes

Government-industry partnership to increase energy efficiency

HUD Partnership for Advancing Technology in Housing (PATH)

Government-industry partnership to develop energy resource efficient affordable housing

DOE Building America Program

Works with members of the home building industry to produce homes that use up to 50% less energy without costing more

Tools & Resources

- Green Building Information
  - Environmental Building News www.buildinggreen.com
  - US Green Building Council www.usgbc.org
  - National Association of Home Builders www.nahb.com
  - US Department of Energy Rebuild www.rebuild.gov
  - Green Building Alliance www.gbapgh.org
  - Rocky Mountain Institute www.rmi.org
  - Sustainable Building Industry Council www.sbicouncil.org
  - Southface www.southface.org
  - National Center for Appropriate Tech www.ncat.org/reh
  - Alameda County www.stopwaste.org

Tools & Resources

- Additional Resources Available Online at www.globalgreen.org
  - Green Building Resource List
    - Top 20 Ways to Green an Affordable Housing Project
  - Publications
    - Blueprint for Greening Affordable Housing
    - Los Angeles Sustainable Building Initiative Guidebook
    - Alameda County Green Building Guidelines for New Home Construction and Home Remodeling
  - Case Studies